		Teaching	Guide		
	Identifying	Data			2022/23
Subject (*)	Plant Biotechnology			Code	610441020
Study programme	Máster Universitario en Bioloxía Molecular, Celular e Xenética				'
		Descrip	tors		
Cycle	Period	Yea	r	Туре	Credits
Official Master's Degre	e 2nd four-month period	Firs	t	Optional	3
Language	SpanishEnglish		,		'
Teaching method	Face-to-face				
Prerequisites					
Department	Bioloxía				
Coordinador	Bernal Pita da Veiga, María de los Ángeles E-mail angeles.bernal@udc.es			@udc.es	
Lecturers	Bernal Pita da Veiga, María de los Ángeles		E-mail	angeles.bernal@udc.es	
	Pomar Barbeito, Federico			federico.pomar	@udc.es
Web	https://campusvirtual.udc.gal/login/index.php				
General description	With Dr. Federico Pomar Barbeito				

	Study programme competences
Code	Study programme competences
A4	Skills to apply molecular techniques to the study of the plant cell physiology, its response to external triggers and their biotechnological
	applications.
A5	Skills of understanding the microorganisms' role as pathogenic agents and as biotechnological tools.
A8	Skills of having an integrated view of the previously acquired knowledge about Molecular and Cellular Biology and Genetics, with an
	interdisciplinary approach and experimental work.
A10	Skills of modifying genes, proteins and chromosomes with biotechnological applications
B1	Analysis skills to understand biological problems in connection with the Molecular and Cellular Biology and Genetics.
В3	Skills of management of the information: that are able to gather and to understand relevant information and results, obtaining conclusions
	and to prepare reasoned reports on scientific and biotechnological questions
B8	Critical reasoning skills and ethical commitment with the society: sensitivity in front of bioethical problems and to the ones related to the
	natural resource conservation
В9	Skills of preparation, show and defense of a work.
C1	Ability to express oneself correctly, both orally and in writing, in the official languages of the autonomous community
C2	Ability to know and use appropriately the technical terminology of the field of knowledge of the master, in the native language and in
	English, as a language of international diffusion in this field
C6	Acquiring skills for healthy lifestyles, and healthy habits and routines.
C8	Valuing the importance of research, innovation and technological development for the socioeconomic and cultural progress of society.

Learning outcomes					
Learning outcomes			Study programme		
	cor	mpeten	ces		
Ability to manage information: gather and interpret data, information and relevant results, draw conclusions and issue		BR1			
reasoned reports on scientific and biotechnological issues		BR3			
		BR8			
		BR9			
Knowing the importance of research, innovation and technological development in the economic and cultural advancement of	AR5	BR8	CC6		
society.	AR10		CC8		
Ability to understand the current state of the Plant Biotechnology and use	AR4	BR1	CC8		
Basic terminology used in the field	AR8				
Adequate oral and written expression in the official languages			CC1		
			CC2		

Contents		
Topic	Sub-topic	
Module 1. Historical development of the Plant Biotechnology	1. The 1 <sup>a</sup> and 2 <sup>a</sup> Green Revolution	
	2. What is thePlant Biotechnology?	
Module 2. Technical approach of the Plant Biotechnology	Genetic engineering in plants: general concepts	
	2. Methods of obtaining of transgenic plants	
Module 3. Main applications of the Plant Biotechnology	Transgenic Plants applications	

	Planning			
Methodologies / tests	Competencies	Ordinary class	Student?s personal	Total hours
		hours	work hours	
Introductory activities	C1 C8	2	0	2
Online forum	B1 C2 C6	0	1	1
Document analysis	A4 A5 A8 A10 B1 B3	0	35	35
	B8 B9			
Collaborative learning	A4 A5 A8 A10 B1 B3	10	20	30
	B8 B9 C1			
Binary questions	A4 A5 A8 A10 B1 B3	2	0	2
Personalized attention		5	0	5

( ) The information in the planning table is for guidance only and does not take into account the neterogeneity of the students.

	Methodologies
Methodologies	Description
Introductory activities	Activities used at beginning of any teaching-learning process to obtain information regarding student competences, interests
	and/or motivations in relation to specific learning outcomes, which educators may then incorporate in their planning to create
	more meaningful, effective learning experiences based on students? existing knowledge.
Online forum	Informal discussion space for students to exchange ideas concerning specific problem or topic. Interaction takes place in
	online learning environment using asynchronous communication tools (?forum?).
Document analysis	Research skills development involving use of audiovisual and/or bibliographical documents (documentary or film extracts,
	news items, advertising images, photographs, articles, legal texts, etc.) relating to specific topic of study, with targeted analysis
	activities. Used as introduction to topic, as focus for case study, to explain abstract processes and present complex situations,
	or as strategy for synthesising content (theoretical and practical).
Collaborative learning	Guided teaching-learning procedures (overseen in person and/or using ICT methods) based on organisation of class in which
	students work together to solve tasks assigned by teacher, with aim of optimising their learning experience and that of other
	members of group.
Binary questions	Objective test in which students are required to respond to a specific question using one of two closed answer options.
	(Answer options for binary questions are ?yes/no? or ?true/false?.)

	Personalized attention
Methodologies	Description
Introductory activities	In tutorial sessions, each student will discuss with the teacher the progress of the course, and all questions that are submitted
Binary questions	to the content thereof.
Collaborative learning	This tutorial sesions will be by Teams preferently, with previously date by mail.
Online forum	
Document analysis	

Assessment

Methodologies	Competencies	Description	
Binary questions	A4 A5 A8 A10 B1 B3	To minimum qualification to surpass to matter will be of 5 points	30
Collaborative learning	A4 A5 A8 A10 B1 B3	Concretion and clarity in the contents	30
	B8 B9 C1	Consults of different sources of information	
Online forum	B1 C2 C6	Participation of active form and proposal of new threads of conversation in the forum	20
Document analysis	A4 A5 A8 A10 B1 B3	His contribution is not a reproduction of the text of origin, but a coherent synthesis in	20
	B8 B9	which only they appear the most important appearances of the same	

Assessment	

	Sources of information
Basic	- (2013). Genetic Improvements in Agriculture. The Plant Cell
	- (2010). The past, present and future of crop genetic modification. New Biotechnology Volume 27, Number 5
	- (2014). A Really Useful Pathogen, Agrobacterium tumefaciens. American Society of Plant Biologists. The Plant Cell
	- (2000). Plantas transgénicas. Preguntas y respuestas. Boletín de la Sociedad Española de Biotecnología
	- Serrano M, Piñol T, (1991). Biotecnología vegetal. Ed. Síntesis
	- Caballero JL, Muñoz J, Valpuesta V, (2001). Introducción a la biotecnología vegetal: métodos y aplicacio.
	Ed.Publicaciones y Obra Social y Cultural Cajasur
	- Slater A., Scout N, Fowler M., (2003). Plant biotecnology: the genetic manipulation of plants. Ed. Oxford
	UniversityPress
	- Henry RJ (2006). Plant conservation genetics. Food Products Press
	- Reinhard Renneberg, Darja SüBbier (2008). Biotecnologíapara principiantes. Reverte
	- Taiz, L., Zeiger, E., Moller, A.M. & Development, 7th. ed. Oxford
	University Press.
	Taiz, L., Zeiger, E., Moller, A.M. & Development, 7th ed. Oxford
	University Press.Taiz, L., Zeiger, E., Moller, A.M. & Durphy, A. (2022). Plant Physiology and Development, 7th
	ed. Oxford University Press.
Complementary	   
Complementary	   

## Recommendations

Subjects that it is recommended to have taken before

Cellular Techniques/610441001

Molecular Techniques/610441002

Subjects that are recommended to be taken simultaneously

Molecular Plant-Pathogen Interaction Mechanisms/610441019

Subjects that continue the syllabus

## Other comments

Program Green Campus Empower of Sciences To help to achieve some sustainable immediate surroundings and fulfil with the point 6 of the Environmental Statement of the faculty of Sciences (2020), the documentary works that realise in this matter: to. They will request mostly in virtual format and computer support b. To realise in paper: -they will not employ plastic -will realise impressions to double expensive -will employ paper recycled -will avoid the realisation of drafts To Environmental Statement is available

in: https://ciencias.udc.es/images/Facultade/Green\_Campus/Regulamento\_Comit%C3%A9\_Green\_Campus\_FCiencias.pdf

(\*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.